WHAT IS CLAIMED IS:

1. A method for depositing a film on a substrate in a chamber comprising: adjusting a temperature of said substrate to a first temperature; introducing a first reactant gas into said chamber; adsorbing substantially at least one monolayer of said first reactant gas onto said substrate; evacuating any excess of said first reactant gas from said chamber; adjusting a temperature of said substrate to a second temperature; introducing a second reactant gas into said chamber to react with said first reactant gas to produce said film on said substrate; evacuating any excess of said second reactant gas from said chamber; and adjusting a temperature of said substrate to a third temperature.

2. The method of claim 1, wherein the method is repeated, without the step of adjusting a temperature of said substrate to a first temperature, to deposit an additional film layer.

3. The method of claim 1, wherein said second temperature is greater than said first temperature and said third temperature.

4. The method of claim 3, wherein said first temperature is between about –40 °C and 300 °C.

5. The method of claim 4, wherein said first temperature is between about 20 °C and 200 °C.

6. The method of claim 3, wherein said second temperature is between about 200 °C and 600 °C.

7. The method of claim 3, wherein said third temperature is between about 20 °C and 200 °C.

8. The method of claim 1, wherein a temperature ramp rate occurring between said first temperature and said second temperature is at least 200 °C per second.

9. The method of claim 1, wherein a temperature ramp rate occurring between said second temperature and said third temperature is at least 100 °C per second.

10. The method of claim 1, wherein said adjusting a temperature of said substrate to a first temperature, said adjusting a temperature of said substrate to a second temperature, and said adjusting a temperature of said substrate to a third temperature is accomplished by using energy selected from the group consisting of ions, electrons, photons, and thermal energy.

11. The method of claim 10, wherein said adjusting a temperature of said substrate to a first temperature, said adjusting a temperature of said substrate to a second temperature, and said adjusting a temperature of said substrate to a third temperature is accomplished using an energy source selected from a group consisting of a rapid thermal processor, a laser, an electron beam source, and an x-ray source.

12. The method of claim 1, wherein the step of adjusting a temperature of said substrate to a second temperature occurs during the step of evacuating any excess of said first reactant gas.

13. The method of claim 1, wherein the step of adjusting a temperature of said substrate to a second temperature occurs during the step of introducing a second reactant gas into said chamber.

14. The method of claim 1, wherein said first reactant gas is a metal-containing precursor.

15. The method of claim 1, wherein said third temperature equals said first temperature.

16. A method for affecting a temperature of a substrate on a pedestal in a film deposition apparatus comprising:

increasing a temperature of said substrate by irradiating said substrate with an energy source and having a heat transferring gas between said pedestal and said substrate at a low pressure; and

decreasing a temperature of said substrate by not having said energy source irradiating said substrate and having said heat transferring gas between said pedestal and said substrate at a high pressure.

17. The method of claim 16, wherein said heat transferring gas is argon.

18. The method of claim 16, wherein said heat transferring gas is helium.

19. The method of claim 16, wherein said high pressure is between about 3 and 10 torr.

20. The method of claim 16, wherein said high pressure is between about 3 and 20 torr.

21. The method of claim 16, wherein said low pressure is less than 3 torr.

22. The method of claim 16, wherein said low pressure is less than 1 torr.

23. The method of claim 16, wherein said energy source is selected from a group consisting of a rapid thermal processor, a laser, an electron beam source, and an x-ray source.

24. The method of claim 16, wherein said substrate temperature is additionally affected by resistively heating said pedestal.

25. The method of claim 16, wherein said substrate temperature is additionally affected by flowing a chilled fluid through said pedestal.

26. A system for controlling a temperature of a substrate in an atomic layer deposition system, said system comprising:

a deposition chamber;

a vacuum pump coupled to said deposition chamber;

a substrate holder located within said deposition chamber, said substrate holder having a passageway for flowing a backside gas into a space between said substrate holder and said substrate on said substrate holder;

a gas inlet coupled to said deposition chamber; and

an energy source for heating by irradiation said substrate on said substrate holder.

27. The system of claim 26, further comprising a means for valving and controlling a pressure of said backside gas.

28. The system of claim 26, wherein said substrate holder is an electrostatic chuck.

29. The system of claim 28, wherein said electrostatic chuck has a means for flowing a fluid therein.

30. The system of claim 29, wherein said electrostatic chuck has a cooling capacity of between about 200 W/m^2 °K and 350 W/m^2 °K.

31. The system of claim 29, wherein said electrostatic chuck has a cooling capacity of at least 200 W/m^2 °K.

32. The system of claim 28, wherein there is a space between said substrate and said electrostatic chuck.

33. The system of claim 26, wherein said energy source for heating said substrate is a rapid thermal processor.

34. The system of claim 33, wherein said substrate is heated with a temperature ramp rate of about between 100 °C per second and 300 °C per second.

35. The system of claim 33, wherein said substrate is heated with a temperature ramp rate of at least 100 °C per second.

36. The system of claim 33, wherein a source for said rapid thermal processor is a graphite heater.

37. The system of claim 33, wherein a source for said rapid thermal processor is a plasma arc.

38. The system of claim 33, wherein a source for said rapid thermal processor is at least one tungsten halogen lamp.

39. The system of claim 26, wherein said energy source is selected from the group consisting of a laser, an electron beam source, and an x-ray source.

40. The system of claim 39, wherein said substrate is heated with a temperature ramp rate of about between 200 °C per second and 700 °C per second.

41. The system of claim 39, wherein said substrate is heated with a temperature ramp rate of at least 200 °C per second.

42. The system of claim 39, further comprising a means for scanning an output of said energy source over a surface of said substrate.

43. The system of claim 39, further comprising a means for scanning said substrate relative to an output of said energy source.

44. A method for depositing a film on a substrate in a chamber comprising: adjusting a temperature of said substrate to a first temperature and introducing a first reactant gas into said chamber to adsorb substantially at least one monolayer of said first reactant gas onto said substrate before evacuating any excess of said first reactant gas from said chamber; and adjusting a temperature of said substrate to a second temperature and introducing a second reactant gas into said chamber to react with said first reactant gas to produce said film on said substrate before evacuating any excess of said second reactant gas from said chamber.

45. The method of claim 44, wherein the method is repeated to deposit additional film layers.

46. The method of claim 44, wherein said second temperature is greater than said first temperature.

47. The method of claim 44, wherein a temperature ramp rate occurring between said first temperature and said second temperature is at least 200 °C per second.

48. A system for depositing a film on a substrate in a chamber comprising: a means for adjusting a temperature of said substrate to a first temperature; a means for introducing a first reactant gas into said chamber; a means for adsorbing substantially at least one monolayer of said first reactant gas onto said substrate; a means for evacuating any excess of said first reactant gas from said chamber; a means for adjusting a temperature of said substrate to a second temperature; a means for introducing a second reactant gas into said chamber to react with said first reactant gas to produce said film on said substrate; a means for evacuating any excess of said second reactant gas from said chamber; and a means for adjusting a temperature of said substrate to a third temperature.

49. The system of claim 48, wherein said means for adjusting a temperature of said substrate to a first temperature, said means for adjusting a temperature of said substrate to a second temperature, and said means for adjusting a temperature of said substrate to a third temperature is selected from the group consisting of ions, electrons, photons, and thermal energy.

50. The system of claim 49, wherein said means for adjusting a temperature of said substrate to a first temperature, said means for adjusting a temperature of said substrate to a second temperature, and said means for adjusting a temperature of said substrate to a third temperature utilize an energy source selected from a group consisting of a rapid thermal processor, a laser, an electron beam source, and an x-ray source.

51. The system of claim 48, wherein said third temperature equals said first temperature.